R E M A R K S

Reconsideration of this application, as amended, is respectfully requested.

THE CLAIMS

Claim 11 has been amended to clarify that the sample chip analyzing device analyzes samples (plural), as well as to correct a minor informality at line 19 with respect to the recitation of the waveguide plate.

No new matter has been added, and no new issues with respect to patentability have been raised which would require further consideration on the merits and/or a new search. Accordingly, it is respectfully requested that the amendments to the claims be approved and entered under 37 CFR 1.116.

THE PRIOR ART REJECTION

Claims 11-13 were again rejected under 35 USC 102 as being anticipated by previously cited USP 5,633,724 ("King et al"). This rejection, however, is respectfully traversed with respect to the claims as amended hereinabove.

As recognized by the Examiner, King et al discloses an apparatus for analyzing samples by exciting a fluorescent substance labeled to the samples complemented to probes at arrays 102 and 430 by an evanescent wave generated when incident

light is entirely reflected by total internal reflection (TIR) surfaces of a prism or an optical fiber and the samples to be analyzed. Thus, as recognized by the Examiner, in both the apparatus disclosed in King et al and in device of the claimed present invention, analysis is carried out by exciting a fluorescent substance labeled to samples by an evanescent wave generated when incident light is entirely reflected by total internal reflection.

It is respectfully submitted, however, that the apparatus disclosed in King et al does not enable samples to be analyzed effectively the fluorescence-pumped fluorescent substances while downsizing and facilitating the apparatus itself by using a low output light source.

More specifically, King et al discloses using a prism that entirely reflects incident light by TIR at an area responsive to the width of the incident light flux. In the apparatus of King et al, only samples complemented to respective probes fixed at the array 102 in the area of total reflection are analyzed. And in the apparatus of King, it is only possible to increase the number of samples to be analyzed by expanding the area of generation of an evanescent wave while widening the width of the incident light flux.

However, since the light intensity distribution of incident light is a Gaussian distribution, the light intensity at

peripheral parts of a light flux is weaker than the light intensity at the center part of the light flux. An evanescent wave generated in this way has a difference in light intensity. And as a result, the fluorescent intensity which is fluorescence-pumped by the evanescent wave becomes uneven at the center part of a light flux and at peripheral parts thereof, whereby fluorescent detection enabled by the pickup members becomes uneven to worsen the analysis accuracy of samples. This is a critical drawback of King et al.

Therefore, in the case of King et al, the light flux width of incident light cannot be widened, and it is only possible to analyze samples of the number responsive to the area of the corresponding light flux width.

By contrast, in the device of the claimed present invention, the end portion of the waveguide plate (to which the samples to be analyzed are connected) entirely reflects and guides incident light internally. That is, the samples to be analyzed are labeled with flourescent substances that are fluorescence-pumped by an evanescent wave which occurs when fluorescent pumping light from the light source is irradiated onto the end face of the end portion of the waveguide plate and enters into an interior of the waveguide plate to be entirely reflected and guided, as recited in claim 11. It is therefore possible to generate an evanescent wave on the entire surface of the waveguide plate at an almost

uniform light intensity. And as a result, the device of the claimed present invention is able to fluorescence-pump fluorescent substances at an almost uniform intensity, and a number of samples complemented on a number of probes fixed on substantially the entire surface of the waveguide plate can be analyzed.

It is respectfully submitted, therefore, that the apparatus of King et al can analyze only a small number of samples located in a narrow area responsive to the light width of incident light, whereas the device of the claimed present invention has a particularly advantageous effect in that a large number of samples to be analyzed can be analyzed in response to a wide area over the entire surface of a waveguide plate at high accuracy. And it is respectfully submitted that this feature of the claimed present invention is not at all disclosed, taught or suggested by King et al.

In addition, it is respectfully pointed out that the device of King et al carries out analysis by adhering arrays 102 and 430, on which samples are fixed, to the TIR surfaces of a prism (see Figs. 1-5) and an optical fiber (see Fig. 6) by means of a matching film, etc. More specifically, samples are fixed on the surface of arrays 102 and 430 on a substrate composed of a substance whose refractive index is equivalent to that of the prism, in particular a glass material.

Therefore, in the case of King et al, an evanescent wave generated on the TIR surfaces of the prism and optical fiber is irradiated onto the samples fixed on the surface of the arrays by being further transmitted through the substrates of the arrays 102 and 430. In this connection, it is noted that the evanescent wave irradiated onto the samples greatly attenuates when it is transmitted through the substrate of arrays 102 or 430 in comparison with the intensity of the evanescent wave generated on the TIR surfaces. And it is therefore difficult to fluorescence-pump the fluorescent substances efficiently.

This drawback of King et al can be solved by increasing the intensity of the evanescent wave generated on the TIR surfaces by strengthening the light intensity of incident light, that is, by increasing the light source output. However, increasing the light source output requires a large-sized light source. At the same time, the heat output of the light source increases when the light source output is increased. Therefore, increasing the light source output requires the apparatus to have a heat-resistant structure to prevent various types of obstacles and troubles due to heat, and it is unavoidable that the apparatus becomes large in size and complicated.

By contrast, the device of the claimed present invention is structured so that an evanescent wave is generated by entirely reflecting incident light in a waveguide plate having a number of

probes directly fixed on the surface thereof. The evanescent wave is thus irradiated directly onto the probes, and there is no substrate which attenuates the evanescent wave as in arrays 102 and 430 in King et al. The apparatus of the claimed present invention can thus be made small-sized using a low output light source.

In summary, it is respectfully submitted that the device of the claimed present invention has a particularly advantageous structure and operational effects by which samples to be analyzed can be analyzed by effectively fluorescence-pumping fluorescent substances while downsizing and the apparatus itself by using a low output light source. And it is respectfully submitted that King et al does not disclose, teach or suggest either the structure of the claimed present invention or the advantageous effects achieved by the structure of the claimed present invention.

Finally, it is noted that on pages 2-3 of the Final Office Action, the Examiner asserts that the arguments set forth in the Remarks of the Amendment filed September 10, 2003 were not persuasive because the "claims in the instant application rely on just one sample being analyzed." (emphasis added) In addition, the Examiner asserts that "The prior art being applied is applicable to this limitation because at least one sample is being analyzed on the surface of the waveguide."

It is respectfully submitted, however, that the disclosure in the specification of the present application is clearly directed to analyzing samples (plural), and independent claim 11 has been amended to clarify that the device of the claimed present invention is operable with respect to samples (plural) to be analyzed.

In this connection, it is respectfully pointed out that in a hybridizing method, which is one of the DNA analysis methods to which the present application is applied, a buffer solution containing a plurality of types of samples to be analyzed is washed onto a plurality of types of probes (respective probes are specified in advance) which are fixed on the surface of the waveguide plate. Samples to be analyzed which are complemented thereto are hybridized on the probes. And fluorescent substances labeled onto the samples to be analyzed are fluorescence-pumped by an evanescent wave for reading. A plurality of samples to be analyzed are thus simultaneously analyzed.

More specifically, it is noted that the specification discloses at, for example, page 4, lines 10-18[1] and page 6,

[1] "For example, in the case where the labeled fluorescent substance for the sample to be analyzed is single, the light source 7 may be a laser irradiating device that outputs light of a specified wavelength by which the corresponding fluorescent substance is pumped or in the case where a plurality of labeled fluorescent substances are used, any one that outputs white light of respective pumping wavelengths may be acceptable." (Page 4, lines 10-18).

lines 19-23[2], that the present application naturally assumes that a plurality of types of samples to be analyzed are simultaneously analyzed.

Indeed, when samples to be analyzed are labeled with a plurality of types of fluorescent substances emitting fluorescence of different wavelengths, respective fluorescent substances are fluorescence-pumped by using RGB mixed lights, and the present application is based on the assumption that there are a plurality of types of samples to be analyzed. If the samples to be analyzed were of one type, it would not necessary to label the samples with a plurality of types of fluorescent substances that fluorescence-pumped at different wavelengths.

It is respectfully submitted, therefore that the disclosure in the specification is clearly directed to "samples to be analyzed", as recited in amended claim 11. And it is respectfully submitted that the present invention as recited in amended claim 11 does in fact patentably distinguish over King et al for the reasons set forth hereinabove as well as for the reasons set forth in the Amendment filed September 10, 2003.

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[2] "At this time, if the labeled fluorescent substances of the sample to be analyzed, which is hybridized to respective sampling probes 15 of the sample chip 9, differ from each other, white light that is mixed by RGB may be used as the light source 7, and the respective fluorescent substances are caused to fluoresce by the respective colors." (Page 6, lines 19-23)

In view if the foregoing, it is respectfully submitted that amended independent claim 11, as well as claims 12 and 13 depending therefrom, all patentably distinguish over King et al, under 35 USC 102 as well as under 35 USC 103.

RE: INFORMATION DISCLOSURE STATEMENT

Submitted herewith is an Information Disclosure Statement identifying Japanese Patent Publication No. 10-221339 which the applicant became aware of within the past three months, after receiving the Final Office Action.

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Entry of this Amendment, allowance of the claims and the passing of this application to issue are respectfully solicited.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned for prompt action.

Respectfully submitted,

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